

## **Energy efficiency in housing**

– guidance for local authorities in Wales



**ENERGY EFFICIENCY**

**BEST PRACTICE  
PROGRAMME**

ARCHIVED DOCUMENT

This Guide includes case studies that illustrate some of the initiatives to promote environmental awareness and energy efficiency in Wales. Each of the case studies covers more than one aspect of energy efficiency so, to assist the reader, the principal topics are tabulated below together with the corresponding case study numbers. The key to the case study numbers is shown below the table.

Topic	Case study
Advice	1, 3, 4
Carbon dioxide emissions	1, 5, 6
City planning	5
Education and awareness	1, 3, 4
Energy ratings	3, 5, 6
Funding	1, 2, 3, 4, 6
Energy surveys	3, 4
GIS and modelling	2, 5
HECA	3, 4
Partnerships	1
Questionnaires	3, 6
Energy efficiency measures:	
Lighting	1, 3
Insulation	1, 2, 3, 6
Double glazing	2, 6
Solar energy	2, 3
Heating and controls	2, 6

#### Key to case studies

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## MINISTER'S FOREWORD

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The importance of energy efficiency for the environment, and particularly the Climate Change programme, cannot be underestimated. Not one day passes without us being reminded rightly of the need to save energy and alter our approach to life. Housing can make a particular contribution to energy efficiency and, in so doing, play a key part in meeting our objectives for affordable warmth and sustainable development.

The Home Energy Conservation Act 1995 represents an important milestone as we move inexorably towards the next century. All local authorities in Wales have prepared reports setting out the energy conservation measures they consider practicable, cost-effective and likely to result in a significant improvement in the energy efficiency of all residential stock in their areas. This has been set at 30% over the next ten years and, although this target is challenging, it is achievable provided local authorities act in a strategic way and in concert with other parties. The Act sets a framework for doing this which the Guide amplifies.

A strong emphasis on the need for strategic planning underpins the Guide and it is imperative

that authorities heed this call. It is, of course, important that these strategies form an integral part of authorities' wider housing strategies and operational plans. The Guide also describes an action programme that can be followed and covers issues such as funding, the need for partnerships, awareness-raising, advice and education, management, monitoring, auditing and reporting as well as preparing for the future.

The interesting and often innovative case studies in the Guide highlight the differing approaches to improving energy efficiency. I am pleased to see that these reflect the very wide range of opportunities which are already in place and that they involve a variety of organisations. One is from a private utility, another from a local energy centre, another from a university, the others from a housing association and two local authorities. This shows clearly that we all have an essential role to play in improving and supporting energy efficiency measures.

I commend this Guide to all local authority practitioners and am confident that it will be used in a practical and beneficial way.

A handwritten signature in dark ink, reading 'Jon Owen Jones'.

Jon Owen Jones

Parliamentary Under-Secretary of State for Wales

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## 1 INTRODUCTION

This Guide summarises Good Practice Guide 82 'Energy efficiency in housing – guidance for local authorities' (GPG 82<sup>[1]</sup>) and introduces additional information and case studies that are more relevant to local government in Wales. GPG 82 is primarily intended for local government in England and provides guidance on how to develop and manage more effective energy efficiency strategies in both social and private sector housing.

**PURPOSE OF THIS GUIDE**

This Guide is part of the framework of guidance supporting implementation of the Home Energy Conservation Act (HECA) 1995 in Wales. It emphasises the importance of integrating energy efficiency initiatives with wider housing and environmental policies and programmes. In particular, it can provide an input to local authorities' preparation of Housing Strategies and Operational Plans (HSOPs) in which energy efficiency should play an integral part.

The Guide is aimed primarily at local authorities, because of their important role in coordinating energy efficiency strategies across both the public and private sectors. It emphasises the scope for energy efficiency strategies to fulfil social as well as environmental responsibilities, and to promote an improved quality of life for local citizens. An integrated, corporate approach cannot be achieved without top-level commitment and drive. The Guide is therefore aimed at chief executives, senior management teams, policy makers and managers in local authorities.

This Guide supersedes the previous Department of the Environment, Transport and the Regions (DETR) strategic guidance 'Energy efficiency in council housing – guidance for local authorities'<sup>[2]</sup> and draws on experience from the Green House Programme (GHP), and the DETR Energy Efficiency Best Practice programme.

**WHY ENERGY EFFICIENCY IS IMPORTANT**

Energy efficiency programmes often form a core element of local strategies for sustainable development because they deliver social, economic and health benefits as well as reducing housing

management costs and helping the environment. Investment in energy efficiency can contribute the following benefits.

- **Housing** – the elimination of condensation and damp with consequential benefits; decreased rent arrears; improved lettable; reduced voids and transfer requests; increased rent revenue; fewer complaints; fewer ad hoc maintenance requests; reduced management costs; increased asset values; and reduced legal costs.
- **Environmental** – reductions in emissions of carbon dioxide (CO<sub>2</sub>), the most significant greenhouse gas, and sulphur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>), which can cause acid rain; and reduced demand for non-renewable energy resources.
- **Economic** – direct financial savings in fuel bills and increased disposable income.
- **Social** – provision of affordable warmth for those on low incomes including the elderly, disabled, unemployed and students; and improved quality of life.
- **Health** – reduced incidence of asthma, bronchitis, flu, colds and related stress through reductions in dampness and mould growth; and a reduction in hypothermia and cold-related illnesses.

**TARGETS FOR ENERGY EFFICIENCY**

The size and tenure of housing in Wales is shown in figure 1. Local authorities can set their own targets for energy efficiency based upon local needs but they should be aware of the wider national and international framework.

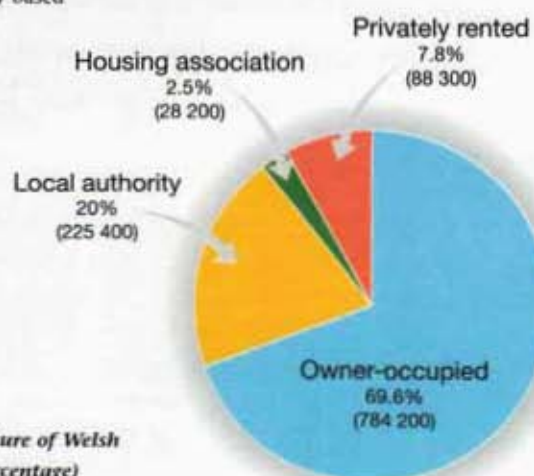


Figure 1 Tenure of Welsh housing (percentage)

*The Guide sets out the strategy-making process as a sequence, based on the steps used in many management systems<sup>[3]</sup>*



## INTRODUCTION

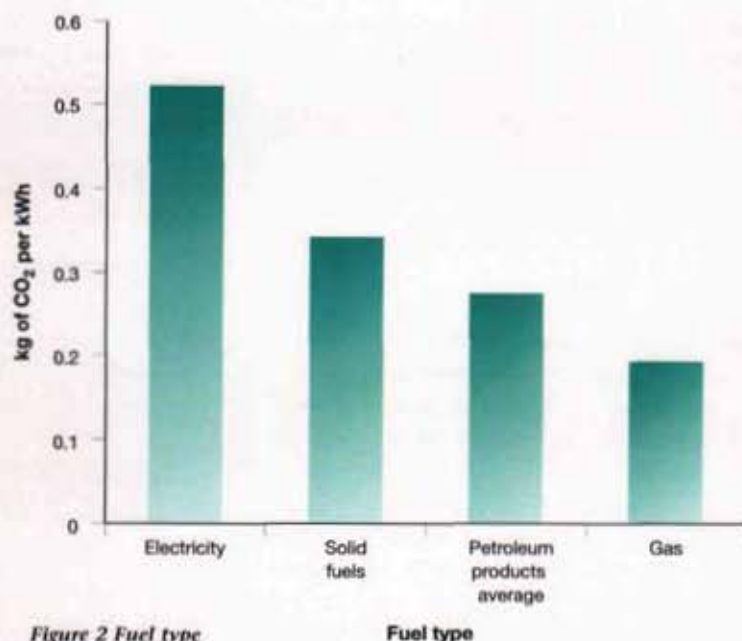


Figure 2 Fuel type and CO<sub>2</sub> production

The UK Climate Change Programme adopted the resolution of the United Nations Framework Convention on Climate Change, to return greenhouse gas emissions to 1990 levels by the year 2000. Subsequently, at the 1997 Kyoto Summit, it was agreed to reduce CO<sub>2</sub> emissions by a further 5.2% by the year 2012. HECA requires authorities to consider strategies showing a

significant improvement in housing energy efficiency (of around 30%). Local Agenda 21 (LA21) provides a consultative framework for sustainable development; energy efficiency initiatives can contribute to the economic, social and environmental objectives of the LA21 process.

Sustainable development concerns not just environmental issues, but social equity and economic issues also. It is concerned with 'improving the quality of life while living within the capacity of supporting ecosystems'<sup>14</sup>.

#### CARBON DIOXIDE EMISSIONS FROM ENERGY USE IN HOUSING

Twenty-six percent of the UK's CO<sub>2</sub> emissions are associated with fuel use in housing. The burning of fossil fuels takes place directly in the home (through use of gas, oil and coal) and indirectly at the power station in the production of electricity. In housing, the use of fuel is associated with space heating, domestic hot water heating, lighting and small power, and cooking. Different fuels produce different quantities of CO<sub>2</sub> per kilowatt-hour (kWh) of energy use, as shown in figure 2, and a comparison of CO<sub>2</sub> emissions for various types of housing is shown in figure 3.

The data shown in figure 3 assumes a standard occupancy pattern, derived from the measured floor area of the dwelling, and a standard heating pattern.

	New-build semi-detached		Existing pre-1919 mid-terrace	
	Built above Building Regs	Built to Building Regs	With improvements	Without improvements*
CO <sub>2</sub> emissions from domestic heating and hot water (kg/yr)	2011	2852	3502	7581
SAP rating	71	66	69	40
Heating (GJ/yr)	22.7	34.2	50.7	133.6
Annual heating costs (£)	288	322	411	749
*Assumptions for existing pre-1919 mid-terrace: floor area - 122 m <sup>2</sup> ; heating - old-style gas fire (open fronted); controls - no thermostat; fabric U-values - 1.5 W/m <sup>2</sup> K (main building), 2.0 W/m <sup>2</sup> K (annexe)				

Figure 3 A comparison of CO<sub>2</sub> emissions and other energy-related data for typical housing stock

CO<sub>2</sub> emissions in this Guide are quoted as kg of CO<sub>2</sub> per kWh of delivered fuel (kgCO<sub>2</sub>/kWh) and kg of CO<sub>2</sub> per year (kg/yr). Conversion from CO<sub>2</sub> to carbon is the ratio of their respective atomic weights (44:12). Thus, 100 kgCO<sub>2</sub>/kWh expressed as carbon is:

$$\frac{100 \times 12}{44} = 27.3 \text{ kgC/kWh}$$



**WHAT IS THE POLICY?**

A policy for residential energy efficiency in housing might be a free-standing document or it might be part of a wider umbrella policy on sustainable development. It should, in any event, form part of authorities' HSOPs. The policy is a written statement of the authority's overall aims and principles of action. Its purpose is to provide a framework for more detailed objectives and management systems, and to inform all staff and the public of the authority's environmental commitments.

The policy is primarily a communication tool and should be kept simple and short. An energy efficiency strategy could start either with a statement of policy, or with a review of current conditions, constraints and priorities. It is recommended that the policy statement is established first and is approved by the appropriate council committee. This will set the framework for subsequent survey work and analysis, which will then refine the policy aims. The policy statement will be implemented by strategy documents that include HECA, HSOP and LA21.

**HOME ENERGY CONSERVATION ACT**

HECA requires the authority to identify energy conservation measures which are likely to result in a significant improvement in the energy efficiency of all residential accommodation in its area and to report on the progress made in implementing those measures. The Government has said that a 30% improvement in 10 to 15 years will be regarded as 'significant'.

**HOUSING STRATEGIES AND OPERATIONAL PLANS**

The HSOP requires an authority to identify main priorities and funding sources within housing. The broad areas to be covered include:

- areas of concern to the locality
- meeting housing needs
- managing and maintaining the public sector housing stock
- contribution to the private stock.

Energy efficiency should be considered in all four areas.

**STRATEGIES FOR SUSTAINABLE****DEVELOPMENT**

Sustainable development strategies focus on quality of life issues connected with economic, social and environmental issues. LA21 provides an opportunity to justify and promote energy efficiency measures in all these areas. The policy statement will be implemented by strategy documents.

A 'sustainability checklist' such as that given in table 1, can be a helpful tool in the process.

**POLICY AIMS AND PRINCIPLES**

The policy statement will often set out the authority's aims and principles. Aims describe what the authority intends to do in broad terms – its general missions or goals. They should be specific enough to be meaningful, but not so specific that they name particular targets or timetables.

Three very broad aims can provide a useful starting point in developing a general energy efficiency strategy:

- to avoid unnecessary use of energy
- to increase the efficiency of energy conversion
- to use the least environmentally damaging forms of energy.

**Table 1 Checklist of sustainable development criteria**

**Does the policy:**

- reduce the use of finite energy and other resources, especially those nearing exhaustion
- reduce the production or emissions of non-degradable wastes, especially where the environment has little or no capacity to contain them
- keep the impact of economic or social activities within environmental carrying capacities at local, regional and global levels
- substitute use of renewable resources for non-renewable resources
- encourage and protect biological diversity
- avoid irreversible loss or damage to features which are naturally, aesthetically or culturally significant to present generations, or which may be for future ones
- enhance aesthetic and cultural diversity
- improve quality of life by meeting people's needs for amenities and services
- encourage activities which provide people with a greater choice of roles which fulfil their economic and social needs
- enable people to participate in the decision-making process around issues which affect their lives
- take account of the needs of people who are disadvantaged.

Based on: Sustainability Appraisal of the Countryside Commission's Strategy<sup>151</sup>

## POLICY

A narrower set of aims, such as those in table 2, might be established for housing or anti-poverty strategies<sup>[6]</sup>, or specific objectives for housing related under these three aims.

Principles describe how the authority is prepared to act to achieve its aims. They are generally types of actions, which might, for instance, include a commitment to training staff or providing information.

### PREPARING THE ENERGY POLICY

The process of preparing the energy policy can be as important as the policy statement itself. Given the wide-ranging impact of energy efficiency, it is important to consult widely, both within the authority, and in the community<sup>[7]</sup>. The community includes the general public, public utilities, housing associations, private house builders, and other housing-related organisations. This helps to spread ownership of the policy and commitment to it.

For the policy to 'carry weight' and achieve corporate commitment, it should be led from the centre. It is often practicable for the policy to be drafted by a single officer rather than a committee. However, interdepartmental, interdisciplinary working groups are essential to review and agree the draft policy. This will involve interdepartmental collaboration between, for example, housing, planning, environmental health and social services, as well as commitment from the chief executive's department.

### ENERGY EFFICIENCY AND JOBS

The implementation of energy efficiency strategies can result in increased jobs<sup>[8, 9, 10]</sup>. Firstly, the implementation of energy efficiency measures can impact on job creation, both in services and manufacturing industries. Secondly, the money saved due to reduced fuel costs is available for

purchasing other things, which again will have an impact on job creation.

Energy conservation is highlighted as a key area in the European Commission's White Paper 'Growth, Competitiveness, Employment'<sup>[11]</sup>.

Table 2 Typical policy aims

- Eliminate fuel poverty.
- Reduce CO<sub>2</sub> emissions.
- Conserve natural resources.
- Reduce deaths from hypothermia.
- Improve housing energy efficiency.
- Provide affordable warmth.

## KEY POINTS

- The policy document is primarily a communication tool and should be kept simple and short.
- It may be a standalone document or form part of a wider umbrella policy (eg LA21 or environmental charter).
- The policy should state the aims and principles of the energy efficiency strategy (in broad terms - what should be done and how).
- To make the policy carry weight, it should ideally be led from the centre (eg the chief executive's department).
- Public consultation helps to spread ownership of, and commitment to, the policy.



## 3 REVIEW

**PURPOSE OF THE REVIEW**

The purpose of the initial review is to provide baseline data for the authority. This will provide a clearer picture of current residential energy conditions, enable the local situation to be compared with the national picture, and include some assessment of current energy efficiency activities and whether or not they are cost-effective. The review will provide the base information to determine the scope for action and savings, and the resources required to implement it.

A key officer should take responsibility for this, perhaps under the directions of a steering group. The information obtained as the result of the review phase will enable local authorities to identify priorities and develop draft action programmes.

**REVIEWING EXISTING SERVICES AND ACTIVITIES**

The existing local authority management structure in relation to energy efficiency should be reviewed, and the potential for interdepartmental collaboration identified.

At an early stage, local authorities should review existing activities, and the scope for new actions, to improve housing energy efficiency in their area. This includes a review of all council services which have an impact on energy efficiency in housing. An assessment of the resources available for implementing energy efficiency measures should also be made.

All departments will need to undertake a 'scoping review' to assess whether their activities significantly influence the amount of energy that householders use, or the way in which they use it.

There are three areas where local authorities will need to review their services:

- dwellings owned and managed by, or on behalf of, the local authority
- dwellings owned by others, but with which the local authority has some involvement, eg because of house condition or through funding or allocation arrangements
- dwellings owned by others with whom the local authority has minimal contact.

It is also important to review what partnerships have already been established internally and with outside organisations, and to identify those areas where partnerships can be established and improved.

**REVIEWING THE ENERGY EFFICIENCY OF THE HOUSING STOCK**

The review should generally provide information to establish the energy efficiency situation in the housing stock across different tenures, compare the local situation with the national picture, and identify data requirements and sources. This is tackled in a series of steps.

**Identifying information requirements**

Local authorities should consider what type of information and level of detail will be required to meet policy objectives. The detail and sophistication of the review will depend on the overall policy at the time.

**Table 3 Possible sources of information**

**Dwelling age**

- Stock databases/property registers.
- Stock condition survey.
- Building control records.
- Planning records.
- Historical Ordnance Survey (OS) maps.
- Geographical information systems.
- Deeds of Covenant.

**Tenure**

- Census data.

**Socioeconomic data**

- Census data.

**Built form**

- Stock databases/property registers.
- Stock condition surveys.
- Enforcement/renovation grant records.
- Estate agent advertisements.

**Insulation**

- Stock condition surveys.
- Enforcement/renovation grant/Minor Works Assistance Grant records.
- Home Energy Efficiency Scheme (HEES) installers/Energy Action Grants Agency (EAGA) Ltd.
- Installation records (local authority and housing association stock).
- Home Improvement Agency (HIA) records.
- Utility records.

## REVIEW

**Identifying existing sources of information**

A substantial amount of the information required for reviewing the housing stock already exists within authorities or partner organisations, or can be obtained relatively easily from local authority or other databases. Potential sources are shown in table 3.

**Gathering further information**

Energy audits establish the base position on energy efficiency in the stock. They can be conducted on three levels:

- a preliminary overall assessment
- a survey of the general state of energy efficiency
- a full survey of properties.

The 1997/98 Welsh House Condition Survey<sup>[12]</sup> will contain information on energy efficiency on an all-Wales basis. However, many local authorities have carried out, or are proposing to carry out, house condition surveys, either of their own stock, or private housing. The inclusion of energy data in such surveys can be a cost-effective source of information on energy consumption.

Social data, such as household composition and population age structure, can be provided by local or national census data. Some information on the level of household income will be available from means testing grant applicants, although the requirements of the Data Protection Act 1984 must be taken into account.

**Compiling a stock profile**

Stock profiles are a means of presenting data collected from existing or new sources. They provide a snapshot of the situation across the stock at a specific time and can be useful for providing a pictorial overview of the stock characteristics.

**REVIEWING RESIDENTS' NEEDS, PREFERENCES AND WILLINGNESS TO INVEST**

Key factors in the review must be the identification of the needs of owners and occupiers, and their willingness and ability to make improvements in energy efficiency. Policies and programmes need to be relevant to the circumstances of the authority's main target groups and, therefore, consultation may be necessary to achieve this.

**HANDLING AND PRESENTING DATA**

How data is handled and presented will depend upon the use to which the data is to be put by local authorities. Geographical information systems (GIS) and databases may be considered. GIS can be used not only as a powerful presentation of information but also to provide information such as floor areas of dwellings. The establishment of an appropriate database on which to store energy efficiency data, and a system to ensure that it can be managed, analysed and updated, is integral to the review stage. Available information systems for the collation of data and reporting should be reviewed and the degree of investment in computer systems and software packages should be determined.

**KEY POINTS**

- Establish a Steering Group with representatives of the range of council services and other partners who should be involved in the review.
- Think carefully about what information is really needed to implement the policy.
- Maximise use of existing data – drawing on a range of housing and energy characteristics, not just home energy ratings (eg Standard Assessment Procedure (SAP)).
- Save time and money by incorporating energy efficiency into other data-gathering exercises (eg housing condition surveys).
- Use sample surveys to derive average estimates for the stock as a whole.
- Consider using GIS to build up a database for the stock as a whole, as data becomes available.
- Ensure that any database or GIS system can interface with other relevant systems.
- Remember to consult your target groups + residents on their needs and views.



## 4 ACTION PROGRAMME

Having established the broad policy framework, and reviewed the opportunities for action, the next step is to agree the action programme. The first stage is to translate the policy aims into more detailed objectives, drawing on the insights gained through the review. Ideally, the programme should define:

- objectives (the detailed goals for energy performance)
- actions (which will be taken to achieve these objectives)
- indicators (by which the effectiveness of the actions will be measured)
- targets (including technical goals, a timetable and deadlines for the actions)
- responsibilities (the roles of named officers or individuals)
- resources (staff time and budgets available).

**OBJECTIVES**

Against the three possible general aims mentioned on page 7, the programme should seek to establish a number of more specific objectives for the local housing sector. Examples are given below.

To avoid unnecessary use of energy:

- promote energy saving in households
- design-out unnecessary energy use in new housing and refurbishments.

To increase the efficiency of energy conversion:

- increase the efficiency of conversion of delivered energy into useable energy
- increase the welfare (ie warmth, light or power) gained from energy (eg combined heat and power).

To use the least environmentally damaging forms of energy:

- use renewable energy sources wherever possible
- encourage the generation of renewable energy in the area.

**ACTIONS**

There may be several actions for each objective, and one action may address several objectives. It is useful to distinguish the different types of actions that can be taken. Table 4 describes three types of actions.

Table 4 Types of actions

- Improvement actions – to address weaknesses and opportunities identified in review, such as investment in thermal insulation and better heating controls, raising awareness or staff training.
- Control actions – measures to verify or ensure that actions are completed, or to take corrective action if not.
- Research actions – additional research or analysis to be taken before committing to specific improvement actions.

**INDICATORS AND TARGETS**

Every action should be accompanied by one or more targets for its implementation, so that its success and effectiveness can be assessed. There is a close connection between targets and indicators – the target answers the question 'What level of success or impact are we aiming to reach?' (eg insulating x% of council houses); the indicator answers the question 'What will we measure to tell us if we are succeeding?' (eg the percentage of council houses insulated at any given time) (see table 5).

**RESPONSIBILITIES AND RESOURCES**

To ensure that the actions are carried out in practice, it is also important to specify who is responsible for each action in the programme. This may be an officer within the authority, or it may be an individual in a partner organisation. Successful implementation of the programme also depends on making the best use of the necessary available financial and staff resources. Well-prepared action programmes may be able to attract funding from external sources.

Table 5 Types of indicators

- Input indicators measure whether an action has been carried out (eg the number of houses insulated).
- Output indicators measure the effectiveness of a single action, group of actions or objective (eg percentage reduction in energy consumption by households).
- Outcome indicators measure the state of the outside environment (eg local air quality or average CO<sub>2</sub> emissions per head).

## ACTION PROGRAMME

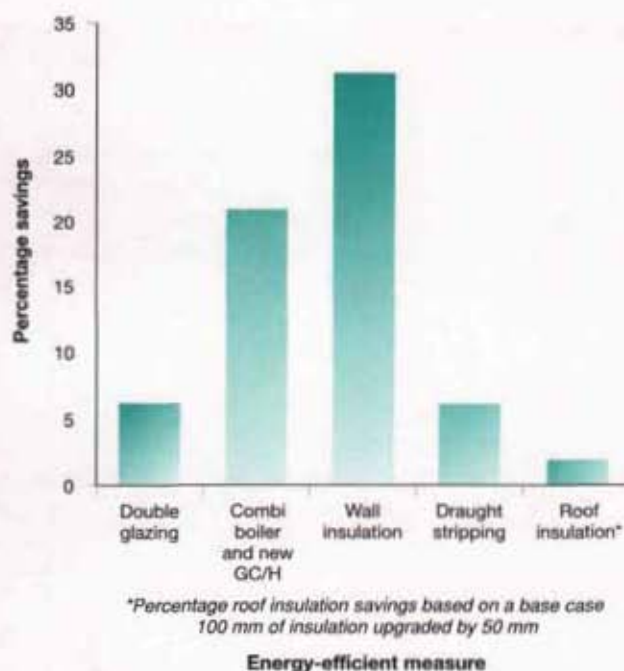


Figure 4 Percentage of heating energy savings associated with different measures on a pre-1919 mid-terraced property.

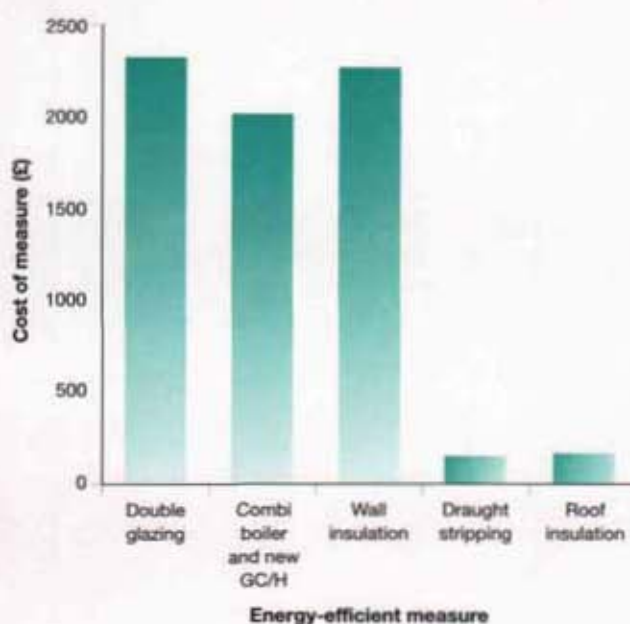


Figure 5 Average costs associated with different measures on a pre-1919 mid-terraced property

## KEY POINTS

- Set a framework of broad aims and specific objectives before identifying actions.
- For each objective, identify the range of actions needed to achieve it.
- Include control and research actions where appropriate, as well as improvement actions.
- Consider joint actions with partners as well as direct actions by the authority.
- Be realistic about what can be achieved – prioritise those actions which meet most objectives.
- Decide how success will be measured (indicators) and what level of success is realistic (targets).
- Make sure that responsibilities and resources are identified for each action.

## HOME ENERGY CONSERVATION ACT SPREADSHEET

The HECA spreadsheet can be used to assess the CO<sub>2</sub> reductions associated with different measures and different housing sectors. The spreadsheet requires the total number of dwellings in each tenure of the stock. It then applies national data developed specifically for housing in Wales to predict the percentage increase in energy efficiency and the percentage decrease in CO<sub>2</sub> from a range of energy-saving measures (see figure 4). If local data exists this should be used to obtain a more accurate forecast.



## 5 FUNDING AND PARTNERSHIPS

The scope for innovative collaborative projects with external agencies is enormous and ranges from data collection to improvement measures, information dissemination, and programmes of advice. Partnerships may include joint financing or help in kind, such as staff, data, resources etc (see case studies 1, 3 and 4).

Energy efficiency measures should be integrated into existing stock maintenance and renovation grant work including area renewal schemes. Opportunities should also be taken to incorporate energy efficiency into broader funding bids. General Information Reports 50<sup>(13)</sup> and 51<sup>(14)</sup> describe some mechanisms for leveraging finance to fund energy efficiency measures in social and private housing.

**INDIVIDUAL ACTION**

Approximately 70% of housing in Wales is owner-occupied and is, therefore, outside local authority direct control. Individual householders should be encouraged to invest in energy efficiency. Awareness campaigns and information centres can inform and advise on the most cost-effective measures. Certain social groups may be eligible for grant aid and should be specifically targeted by awareness campaigns. Where local authorities take the lead in area renewal schemes, they can encourage energy efficiency measures.

**PRIVATE SECTOR**

Private sector partnerships can fund energy-saving measures with the private sector partner sharing in the cost savings. This can concentrate resources including funds and expertise. Potential partners include public electricity suppliers (PES) (see case study 1), lending agencies and the DIY market.

The Private Finance Initiative (PFI) was launched in 1992 with the aim of improving the quality and quantity of public sector capital projects and

delivering higher quality and more cost-effective public services by involving the private sector more directly in their provision. The Government believes that the PFI should be the procurement route of choice for all public sector bodies, where it can deliver superior value for money. A recent report<sup>(15)</sup> summarises a study into private finance and energy efficiency in council housing.

**OTHER SOURCES OF FUNDING ADVICE**

- Energy Saving Trust (EST) programmes, particularly HECAction (see case study 4)
- Best Practice Design Advice Service
- Research bodies
- Energy Clubs.

## KEY POINTS

- Ensure that energy efficiency is integrated with other renovation grant work.
- Take opportunities to incorporate energy efficiency into broader funding bids (eg Single Regeneration Budget (SRB), Rural Challenge).
- In competitive bids, explain how energy efficiency initiatives will improve housing quality.
- Maximise funding from HEES, and consider seeking funds from the EST's HECAction project.
- Seek funding under the Standards of Performance scheme.

**CENTRAL GOVERNMENT GRANTS**

- Home Energy Efficiency Scheme (HEES).

**LOCAL AUTHORITY ADMINISTERED FUNDING**

- Private sector renewal including renovation grants and Area Renewal (see case study 6).
- Agency services.
- Local authority stock – capital and housing.
- Housing Revenue Account.
- Social Housing Grant.

**EUROPEAN SOURCES**

- SAVE programme.
- THERMIE programme (see case study 2).
- JOULE programme.

## 6 AWARENESS-RAISING, ADVICE AND EDUCATION

Awareness-raising, advice and education help to alter people's behaviour so that they use energy more efficiently. Consequently, they are fundamental to any energy efficiency strategy. An authority should decide which groups to target

in order to influence their behaviour and the type of information they are trying to impart, whether technical or lifestyle-related.

Energy advice has long been a significant element of energy policy, and guidance is available in the form of Good Practice Guide 208<sup>[16]</sup>. Advice services may be 'reactive', where the authority responds to requests for advice from the public, or 'proactive' where the authority targets a particular group<sup>[17]</sup>. A basic principle for any programme of awareness-raising or advice is that it is only possible to engage people's interest around their personal concerns.

**OWNER-OCCUPIERS**

Most homeowners can afford to use energy to stay warm. Consequently, they are an important focus for energy-saving measures because they offer potentially significant savings. Research carried out into owner-occupiers' attitudes to energy efficiency has led to some important guidelines (see table 6).

**PRIVATE LANDLORDS**

Private landlords will be motivated by lower running costs, less bother from tenants, and prompt payment of rents. Authorities can develop a Landlords' Forum or similar, through which energy efficiency can be promoted.

**PRIVATE HOUSEHOLDS**

There is considerable scope to provide energy advice to all private households, both rented and owner-occupied, through existing council services, ie environmental health, building control and planning.

**LOW-INCOME HOUSEHOLDS**

If the agreed energy policy focuses on affordable warmth, the authority may seek to target lower-income households. Social and care workers are often in touch with more vulnerable householders. Front-line housing staff, housing officers, maintenance workers and rent officers can deliver a range of advice during their day-to-day contacts with social housing tenants and with private sector tenants and owner-occupiers in renovation schemes.

**Table 6 Guidelines on promoting energy efficiency to owner-occupiers**

**Image**

- Energy efficiency should be promoted as a smart, sensible, adult action.
- Messages should be stylish and stress comfort, luxury, and technology as well as financial saving.

**Marketing**

- The same message should come from all sources.
- There should be continuity and coordination.

**Information**

- Its independence should be guaranteed by an impartial body such as the Government or the Consumers' Association.
- It should be specific to different types of solutions.
- It should not focus on brands of products, but on types of measures.
- It must be offered when an opportunity for investment arises.
- It should allow comparisons – show costs/benefits in a standard way.
- It needs to be backed by accreditation/code of conduct/guarantees.
- It needs to be appropriate to the target audience.

**Incentives**

- There should be the option of creative funding solutions, eg pay for energy efficiency measures through the fuel bill.
- Packages of measures should be offered.
- Discounts and grants should be promoted when available.

**Integration**

- Make energy efficiency an integral part of the home improvement message, not an add-on.
- Ensure that key players give the same message and that their schemes are complementary.



## AWARENESS-RAISING, ADVICE AND EDUCATION

**ENERGY EFFICIENCY ADVICE CENTRES**

Energy Efficiency Advice Centres (EEACs) are set up by local authorities with support from the EST to promote energy efficiency to all public and private sector housing and small businesses (see case study 3). They provide free independent expert advice on how to improve the energy efficiency of buildings, particularly their heating and lighting systems. The EEACs also administer the Home Energy Survey, which provides advice to individual householders on energy savings.

**GENERAL PUBLIC**

There are various mechanisms for delivering advice to the general public, although recent work by the NEA suggests that the most cost-effective form of energy advice delivery is still face to face in the client's home. This should form part of a wider energy advice strategy that could include the following:

- drop-in centres
- telephone advice lines
- demonstration houses
- travelling advice services offering displays and talks at community centres and accessible neighbourhood meeting places.

**YOUNG PEOPLE**

The involvement of young people is one of the most effective ways of getting the message on energy efficiency into households, as well as ensuring that future generations make energy saving a central part of their everyday lives. Promoting environmental awareness through work with primary and secondary schools and colleges, as well as youth groups, is therefore an important course of action for local authorities.

**KEY POINTS**

- Think about which groups you want to reach.
- Take into account their motivations/concerns about energy efficiency.
- Target advice to overcome the barriers they face.
- Be imaginative in identifying partner/outlets to reach these groups.
- Involve existing advice organisations such as NEA, Global Action Plan (GAP) and EEACs.



Figure 6 A presentation to schoolchildren at the Valley's Energy Action mobile advice centre

## 7 MANAGEMENT



### MANAGEMENT SYSTEMS

An effective management system is essential to the implementation of a housing energy efficiency strategy. Individual staff can be given specific responsibilities and training if required, and appropriate management procedures established. A formal environmental management system (ISO 14001 or EMAS<sup>(4)</sup>) can be useful to ensure a thorough and consistent approach to implementation of the programme.

### CORPORATE COMMITMENT

The first and most important step in establishing an effective energy efficiency programme is to gain the commitment of councillors and chief officers. Often this will be achieved gradually over a period of time. As this is partly a process of awareness-raising, it will be useful to make members and chief officers aware of the practical benefits of energy programmes.

### INTERDEPARTMENTAL COORDINATION

While energy efficiency programmes for the council's own stock are likely to be led by the housing department, there are important roles for many other departments in delivering an effective corporate strategy for all housing. A management system for residential energy efficiency might include, inter alia, environmental health, building control, and social services departments. Table 7 shows the possible roles for other departments within a management system for residential energy efficiency.

### STAFFING

Authorities will vary as to which organisational units lead different aspects of the energy efficiency programme. A guiding principle is that whoever is responsible for a particular service, activity or area of work within the authority should also have ultimate responsibility for actions on energy efficiency related to that service. Ideally, energy management should be made mainstream, and integrated into the everyday functions of all staff.

### ENERGY PROJECT TEAM

A project team on integrating energy efficiency into current management systems needs to be established. This includes the need for an energy group to monitor, report and act on information arising from audits.

### STAFF TRAINING

Staff training is fundamental to a successful energy efficiency programme. Whether or not there is a dedicated energy management unit, it is essential that the authority builds sufficient management capacity and competence to carry out its energy strategy.

## KEY POINTS

- Consider adopting a formal environmental management scheme (Eco-Management and Audit Scheme (EMAS) or ISO 14001).
- Build corporate commitment by raising awareness of the benefits of energy programmes.
- Ensure that all relevant departments are involved in implementation of the action programme.
- Set up an interdepartmental Steering Group to manage the action programme and overall strategy.
- Identify staff training needs to ensure successful implementation of the programme (eg energy awareness, energy rating, energy management).
- Work towards a situation where energy efficiency is integrated into mainstream activities.



## MANAGEMENT

Table 7 Possible roles of different departments in the energy efficiency strategy

Department/function	Energy management roles
<b>Housing</b>	Energy efficiency specifications, standards and measures in new build and refurbishment work. Liaison with, and advice to, housing associations HSOP and other spending proposals. Energy-saving advice to tenants. Data collection.
<b>Environmental health</b>	Criteria for allocation of renovation grants/area-based renewal schemes. Energy advice to households. Liaison with landlords. Enforcement notices.
<b>Social services</b>	Energy efficiency standards and measures in all new build and refurbishment work. Energy advice for vulnerable clients and recipients of community care. Referrals for HEES grants. May have a key role in integrating affordable warmth/fuel poverty into an anti-poverty campaign.
<b>Leisure and recreation</b>	Linkage to combined heat and power (CHP) schemes or projects recovering waste heat for swimming pools.
<b>Education</b>	Energy management in schools, youth centres, and further education colleges. Energy education in the curriculum and special projects.
<b>Planning/technical services</b>	Design guidance promoting energy efficiency, renewables and CHP schemes. Provision in the development plan for CHP and renewables. Location of housing with respect to local amenities and public transport. Surveys and data collection.
<b>Regeneration</b>	Comprehensive renewal and demolition programmes can have a substantial impact on the stock energy rating.
<b>Economic development unit</b>	Collaborative projects with local businesses (eg community heating). Establish partnerships for energy advice. Identify potential sponsors for leaflets or events. Setting up of new businesses, delivering energy efficiency.
<b>Waste management</b>	Support waste-to-energy projects, particularly with CHP.
<b>Central/corporate services</b>	Environmental criteria in corporate procurement of energy and in purchasing energy-efficient products, perhaps on behalf of residents. Energy management staff and staff training programmes in energy efficiency.

## 8 MONITORING, AUDITING AND REPORTING

Monitoring provides feedback for the authority to assess whether its strategy is working, and to take appropriate corrective action where necessary. It is essentially a continuous process, being part of the management system whereby individual officers can be assessed against their responsibilities. The effectiveness of the strategy will need to be monitored at different levels, according to the chosen 'input', 'output' and 'outcome' indicators.

### MONITORING INPUTS

Monitoring inputs is straightforward and important, in order to check whether actions have been undertaken as planned. If not, the reasons for delay or non-implementation need to be investigated and addressed. Examples of input targets include giving energy advice to 2500 households per year and approving 100 discretionary grants per year to the target standard.

### MONITORING OUTPUTS

One of the key areas for monitoring will be an assessment of the effectiveness of actions and objectives in meeting their specific output targets. A fundamental requirement here is that it should be possible to monitor output targets, eg reducing the number of complaints of condensation from the private-rented sector by a certain percent, or bringing a specific number of households per year to the target standard through discretionary grants, or improving energy efficiency in line with a specific target during the life of a renewal area.

### MONITORING OUTCOMES

The ultimate outcome sought through the energy efficiency policy is likely to be the reduction of CO<sub>2</sub> emissions, (and the local contribution to climate change). Setting annual targets towards this aim will make it possible to measure overall progress and help to refine annual objectives and actions.

### AUDIT

Authorities will also wish to undertake systematic and periodic reviews of the management system established to implement the strategy. In particular, they will seek to assess whether

management activities are implemented effectively and conform to the programme, and how effectively the system and procedures fulfil the policy. This can be achieved by undertaking periodic audits of the management system for energy efficiency.

### REPORTING

The local authority should be accountable to the public for the commitments that it makes in its published policy documents. Some public reporting is therefore desirable and could yield important public relations benefits. Under EMAS regulations, an environmental statement should be prepared following the review and after the completion of each audit cycle. It should be designed for the public and written in a clear, concise style, free of jargon and complex technical material.

## KEY POINTS

- Make sure you monitor not only whether actions are being undertaken but also how effective they are in practice.
- In particular, consider how you will monitor the effectiveness of energy advice.
- Remember to monitor the energy efficiency strategy's overall contribution to your policy aims.
- Reduce monitoring costs by integrating data collection and storage with general stock data.
- Make arrangements for periodic audit of the management system for energy efficiency.
- Publish information on energy efficiency performance in the housing stock as a whole.



## 9 PREPARING FOR THE FUTURE

The policy, review and programme should be reviewed and revised periodically as external circumstances change. While it is difficult to predict accurately the way in which the energy markets, or UK or EU policies, will move over the next five years or so, it is worth examining current trends for any useful clues for local authorities on the future direction that their energy efficiency strategies might take.

**UK CLIMATE CHANGE PROGRAMME**

The UK Climate Change programme adopted the resolution of the United Nations Framework Convention on Climate Change, to return greenhouse gas emissions to 1990 levels by the year 2000. Subsequently, it was agreed to reduce CO<sub>2</sub> emissions by a further 5.2% by the year 2012. This increases the urgency for local authorities to develop strategies for achieving a 30% improvement in housing energy efficiency.

**LIBERALISATION OF THE DOMESTIC ENERGY MARKET**

Liberalisation of the domestic electricity market from September 1998 affects over 20 million customers and will dominate any consideration of domestic energy issues for some years. Liberalisation may actually have little effect on the consumption of energy resources as it introduces increased competition, which will promote efficiency of production and supply. However, liberalisation allows local authorities to sell gas and electricity to their tenants – they could then use any profits to fund efficiency measures. EST's report 'Leap into the Void' provides more information<sup>(10)</sup>. Other contacts and sources of information are given on page 33.

**NATIONAL AIR QUALITY STRATEGY**

Part IV of the Environment Act 1995 concerns air quality and requires, among other things, the Secretary of State to publish a National Air Quality Strategy. The Act also requires every local authority to conduct, from time to time, a review and assessment of air quality and likely future air quality. Where an authority fails to meet air quality standards or objectives, it is required to designate appropriate areas as 'air quality management areas' (AQMAs) and to prepare an action plan on how it proposes to achieve the relevant air quality standards.

**EUROPEAN COMMISSION INITIATIVES**

The European Commission's White Paper on energy policy<sup>(11)</sup> sets out a strategy for a more active EU

energy policy based on closer coordination of national policies.

The European Commission's first programme on Specific Action for Vigorous Energy Efficiency (SAVE) was started on 1st January 1991.

The SAVE II programme was adopted by the Council of Ministers on 31st December 1996 and will run until 31st December 2000. The programme aims to improve the overall energy efficiency of energy use in the EU by 1% per year more than would be otherwise attained until the end of the programme. The measures include labelling and energy standards for domestic appliances.

The EU White Paper and SAVE II proposals suggest that the European framework of measures promoting energy efficiency is likely to be strengthened in the coming years. This has obvious implications for UK government policy and is likely to increase pressure on local authorities to tackle the energy efficiency of the local residential sector.

## KEY POINTS

- Findings from monitoring and auditing should be fed back into the next cycle of the management loop.
- External trends should also be taken into account when the policy and programme come up for review.
- Specific trends which may affect local authority energy efficiency strategies in future years include:
  - the UK Climate Change programme
  - liberalisation of the domestic energy market
  - new local authority responsibilities for air quality under the Environment Act 1995
  - strengthening of the EU framework of measures for promoting energy efficiency (including proposals for SAVE II).
- The increasing weight being attached to CO<sub>2</sub> reductions by the EU and by the UK government suggests that there will be an increasing need for local authorities to develop long-term strategies on energy efficiency.

## CASE STUDY 1

## SWALEC - Private Sector Partner

**ENERGY EFFICIENCY STANDARDS OF PERFORMANCE**

The Energy Efficiency Standards of Performance (EESoP) scheme was established in 1994. EESoP set public electricity suppliers (PESs) an energy-saving target of 224 GWh over a 4-year period. Under the scheme, SWALEC has subsidised a number of energy-saving projects in partnership with housing associations and local authorities in Wales. When completed, these projects will provide in the domestic sector:

- over a quarter of a million low-energy lamps
- cavity wall insulation to nearly 4000 homes
- loft insulation to over 1800 homes
- insulation jackets for over 3000 domestic hot water tanks.

**ENERGY SAVING PARTNERSHIPS**

The Energy Saving Partnerships initiative was launched in April 1997, assisting customers such as local authorities by funding domestic energy-efficient measures. SWALEC identify and evaluate suitable energy-saving opportunities with the authority, and subsequently provide the necessary capital for the equipment. SWALEC's investment is recovered over an agreed period of time from the resulting energy cost savings.

While this initiative has broad applications across a wide range of energy-saving technologies, initially it has focused on more efficient lighting. The use of such partnership schemes can help authorities go some way towards achieving the targeted 30% reduction in CO<sub>2</sub>.

**ENERGY SAVING PARTNERSHIP PROJECTS****Torfaen County Borough Council**

SWALEC has arranged funding for a lighting refurbishment scheme in Torfaen. Energy-efficient lighting has been installed in sheltered housing and flats, and the power consumption reduction is around 150 kW of power savings for the whole scheme. The total annual savings amount to around £50 000.

**Caerphilly County Borough Council**

SWALEC has also arranged funding for a lighting refurbishment scheme in Caerphilly. Energy-efficient lighting has been installed in a range of buildings, including 18 residential homes, and the power consumption reduction across the properties is estimated to be around 300 kW. The estimated annual saving amounts to around £100 000.



*Figure 7 New high-frequency light fittings provide lower energy bills and longer lamp life*



## CASE STUDY 1

### ENERGY EFFICIENCY STANDARDS OF PERFORMANCE PROJECTS

SWALEC projects carried out under EESoP in partnership with local authorities include:

- Blaenau Gwent County Borough Council – provision of low-energy lighting to the elderly
- Newport County Borough Council – cavity wall insulation of housing stock
- Torfaen County Borough Council – improvements to heating system
- Caerphilly County Borough Council – cavity wall insulation of housing stock.

These projects included a capital investment of approximately £110 000, contributing to total energy savings of approximately 11 GWh.



Figure 8 SWALEC provides tips for customers on reducing energy and saving money

Figure 9 SWALEC's cartoon character Bill Cutter was created to help promote energy-saving techniques





## CASE STUDY 2

### New and refurbished low-energy housing, Gwalia Housing Society



Figure 10 Steel frame low-energy housing at Garnant

#### NEW HOUSING

Gwalia Housing Society designs new housing with energy efficiency as a priority, even within the restricted budgets that apply to social house building. In the Society's view, the benefits are: greater warmth and comfort for tenants; healthier living conditions; reduced condensation and mould growth; reduced maintenance costs; and reduced fuel bills. In addition, this reduces the global impact due to reductions in CO<sub>2</sub> emissions and savings on non-renewable fuels.

Gwalia's house designs pay particular attention to high levels of thermal insulation, reduced air leakage, low-emissivity (low-e) glazing, use of solar energy, and more efficient heating systems and controls. They have recently completed a housing estate at Clase, Swansea, which incorporates most of these measures, including solar domestic water heating. The project was part funded under the European THERMIE demonstration programme. The houses have a 'breathing' wall timber frame construction, using

'Environmental concerns are very important to the design of buildings, with the principles of the sustainability of the urban structure and local communities fundamental to the process. Consideration of the use of natural resources, energy conservation and healthy living also dictate design solutions and the choice of building technologies and materials.'

*Phil Roberts, Director of Development, Gwalia Housing Society.*

'blown fibre' thermal insulation, achieving U-values of 0.21 W/m<sup>2</sup>K. Roof U-values are 0.18 W/m<sup>2</sup>K. The windows have double and triple low-e glazing and a condensing boiler powers the gas central heating system. The average heating energy bill is predicted to be about £2 per week.

Gwalia is noted for its innovative approach to house design. The steel frame housing at Garnant has a breathing wall construction with external mineral wool lamella insulation panels in addition to the 150 mm of insulation batts within the steel

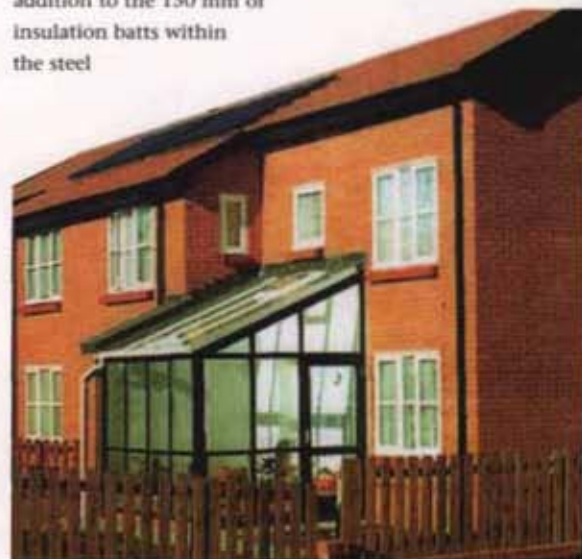


Figure 11 Three-bedroom housing at Clase with sunspace and solar water heating on roof



## CASE STUDY 2



*Figure 12 The Swansea Foyer is a redevelopment of the Swansea Working-Man's Club, retaining the original front and side façades*

frame, achieving a wall U-value of  $0.16 \text{ W/m}^2\text{K}$ . Although the steel frame construction has a relatively high embodied energy content, it is 100% recyclable and therefore provides a sustainable alternative to timber.

#### REFURBISHMENT PROJECT

The Swansea Foyer provides training and accommodation for homeless and unemployed young people. The building involved the redevelopment of the Swansea Working-Man's Club, built in 1885. The design called for an energy-efficient, environmentally friendly building for 35 tenants.

The building has a timber frame construction, achieving wall U-values of  $0.2 \text{ W/m}^2\text{K}$ . Domestic hot water is partly provided by solar panels on the roof, and photovoltaic panels provide electricity for water pumps and electrical back-up systems. The glazed street acts as a passive solar heat collector in winter and is part of the natural ventilation system of the building. Dynamic thermal modelling of internal temperatures and air movement of the street was carried out as part of the design process.



*Figure 13 The internal street and main energy-saving measures of the Swansea Foyer*



## CASE STUDY 3

## West Wales ECO Centre

The West Wales ECO Centre in Newport, Pembrokeshire was the first local energy advice centre to become operational in Wales. This followed a successful bid for funding from the EST and securing matching funding from Environment Wales (an environmental charity in Cardiff) and the Welsh Development Agency. The West Wales Energy Group (a local environmental charity) was then successful in receiving European Regional Development Funds to set up a much larger 'umbrella' project which included an ECO Centre to accommodate the Energy Efficiency Advice Centre (EEAC).

**THE ECO CENTRE PROJECT**

The ECO Centre comprises a visitor centre with an energy and environment theme, which provides free and impartial advice on energy conservation for homes and small businesses, as well as information on wider environmental issues. The Centre is supported by an education officer, an environmental officer and an information technology (IT) specialist. The Centre's activities cover rural Wales which includes six local authority areas.

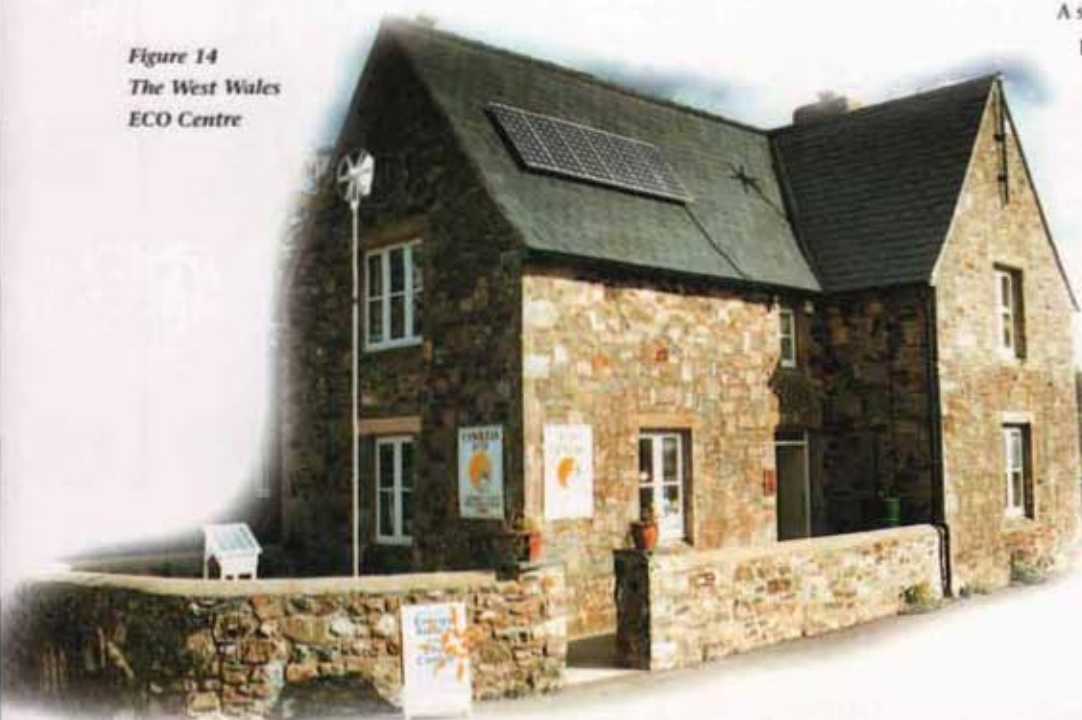
The Centre is housed in part of a converted Victorian school, which is an exemplar of good

energy-efficient design. Renovations to the building include installation of a high level of insulation, an efficient heating system, low-energy lighting and a photovoltaic power supply. The final building achieved a SAP rating of 100 and an National Home Energy Rating (NHER) of 10. When the power system was linked to the national grid, the centre became the smallest and 'greenest' power station in the country. It is now well established as a 'tourist attraction' and is being used by local groups, providing a meeting room, office facilities and access to the Internet for the local community.

**RAISING AWARENESS**

The Centre aims to maximise visibility in the community through involvement in high profile and innovative events. It is hoped that this will help improve communication with rural areas. An 'Energy Bus' mobile unit was formed so that the centre could be represented almost anywhere, including many agricultural shows. The Centre also runs an annual school 'Energy Challenge' project incorporating a competition based on renewable energy.

Figure 14  
The West Wales  
ECO Centre



A solar-powered bicycle was developed as part of the Centre's renewable energy work, which received international press and television coverage. A 500-mile solar bike tour of Wales was undertaken, providing presentations to 22 primary schools en route. Through this mechanism, a further 2000 homes were surveyed using a specially designed Home Energy Trail (a home energy survey designed for children). The event was part sponsored by the Youth Hostel Association. SWALEC and MANWEB participated by offering prizes for the participating schools.



## CASE STUDY 3

A significant part of the Centre's work involves providing advice through a computer questionnaire. This ensures that only advice relevant to a particular household is provided, together with details of any grants or special offers that may be available to them. This process collects energy data which is supplied to the local authorities.

**MONITORING**

The Advice Centre conducts a significant amount of market research, in particular monitoring changes in attitudes and behaviour after receiving the Centre's advice on energy efficiency. Recent statistics indicate that there has been a 12% improvement in the uptake of energy-efficient measures in the group receiving the Centre's information. This compares to a 1% improvement per year in the control group/general population.

**CONSORTIUM**

The Advice Centre has set up a consortium comprising six local authorities, within which a group of local authority officers work on the requirements of HECA. Monthly meetings are organised, chaired and held at the EEAC. Each local authority gains from the collective strength of the others, receiving support and confidence from each other, and benefiting from the work of the EEAC. They have the opportunity to learn from external speakers invited to talk about specific topics



*Figure 15  
The solar-powered bicycle*

relevant to the Act. Any costs involved can be shared between the various partners and joint bids for funding can be made.

This approach is very cost-effective for the authorities concerned, while the EEAC achieves two objectives – it provides the potential for a more secure financial base and strengthens the ability to carry out its own constitutional aims.

The consortium approach illustrates that with the willingness to embrace partnerships, a small local environmental group can have a significant impact on energy efficiency improvements in the community.



*Figure 16  
The Energy Bus*



## CASE STUDY 4

## Merthyr Tydfil County Borough Council

Merthyr Tydfil County Borough Council joined a consortium of local authorities in South Wales and formed a partnership with the local Neighbourhood Energy Action organisation. The aim was to enable local authorities to formulate HECA strategies and access HECAAction funding and local industrial sponsorship. This was achieved through the establishment of a HECA discussion forum.

#### HOME ENERGY CONSERVATION ACT FORUM GROUP

The HECA discussion forum was initiated by Merthyr Tydfil County Borough Council and Valleys Energy Action (formerly Mid Glamorgan Energy Action (MEGA)) following local government reorganisation. The aim was to bring together those who would be involved in HECA delivery in their new unitary authorities in order to share information ideas and resources. Initially the group invited experts from local universities, the Welsh Office, and a theatre-in-education group to advise on technical and educational aspects of HECA delivery. Valleys Energy Action was also able to bring valuable assistance from industrial and commercial partners.

#### THE NEED FOR A MOBILE ENERGY ADVICE CENTRE

In order to deliver the information, advice, education and promotion requirements of HECA, an energy efficiency advice centre was required to serve the valley communities of South Wales. It was apparent that an energy advice centre in each authority was not initially justified owing to

the relatively small and scattered nature of the South Wales valley communities and the lack of a focal centre within the valleys. A mobile centre was identified as a means by which energy advice could be taken direct to communities and schools, and to householders in their workplace.

#### HECACTION

A bid for HECAAction funding was organised in order to develop the mobile centre. This required a strong commitment from the participating authorities and the lead authority. The lead authority was required to produce a HECA strategy report 15 months prior to it being required by the Secretary of State. As a result of the success of the HECAAction bid, a mobile energy and advice centre has been formed and is now part of the EST network of EEACs. The centre contributes towards the delivery of HECA by the unitary authorities of South Wales.



Figure 17 Local authority members of Valleys Energy Action Consortium



## CASE STUDY 4

**THE MOBILE CENTRE'S ACTIVITIES**

The mobile centre is used for school project days in collaboration with Ogwr Education Business partnership. The mobile centre has been successful in training Year 7 pupils in home energy surveys using the EST 'home energy check'. Pupils are taught during a project day which concentrates on the environmental aspects of energy use and the impact of energy use at school and in the home.

The mobile centre is used to provide face to face energy advice and also to promote wider environmental issues in the context of LA21 at all of the following:

- summer fairs, and homes and gardens type shows
- shopping centres
- civic centres
- council housing offices
- local industrial and commercial sites
- Valleys Radio Roadshow events.

A high survey response rate is helping the local authority to establish a profile of all homes using the Valleys Energy Action energy advice centre database. Schools also benefit in terms of improved good housekeeping within the establishment, by advice on effective investment strategies and in monitoring and targeting. The EST Schools Energy Efficiency Programme run by the Centre for

Research, Education and Training in Energy (CREATE) is one strategy currently being employed by the centre. This is an EST-funded scheme that provides a 50% grant towards energy-saving investments for schools, while the advice centre offers an additional 50% interest-free loan.

The potential to link advice on effective energy efficiency in the home with that in the workplace is used to promote organisation-wide commitment to energy efficiency. The mobile centre provides on-site prominent visible 'branding' of energy efficiency and the importance attached to this and the environmental aspects of energy use.

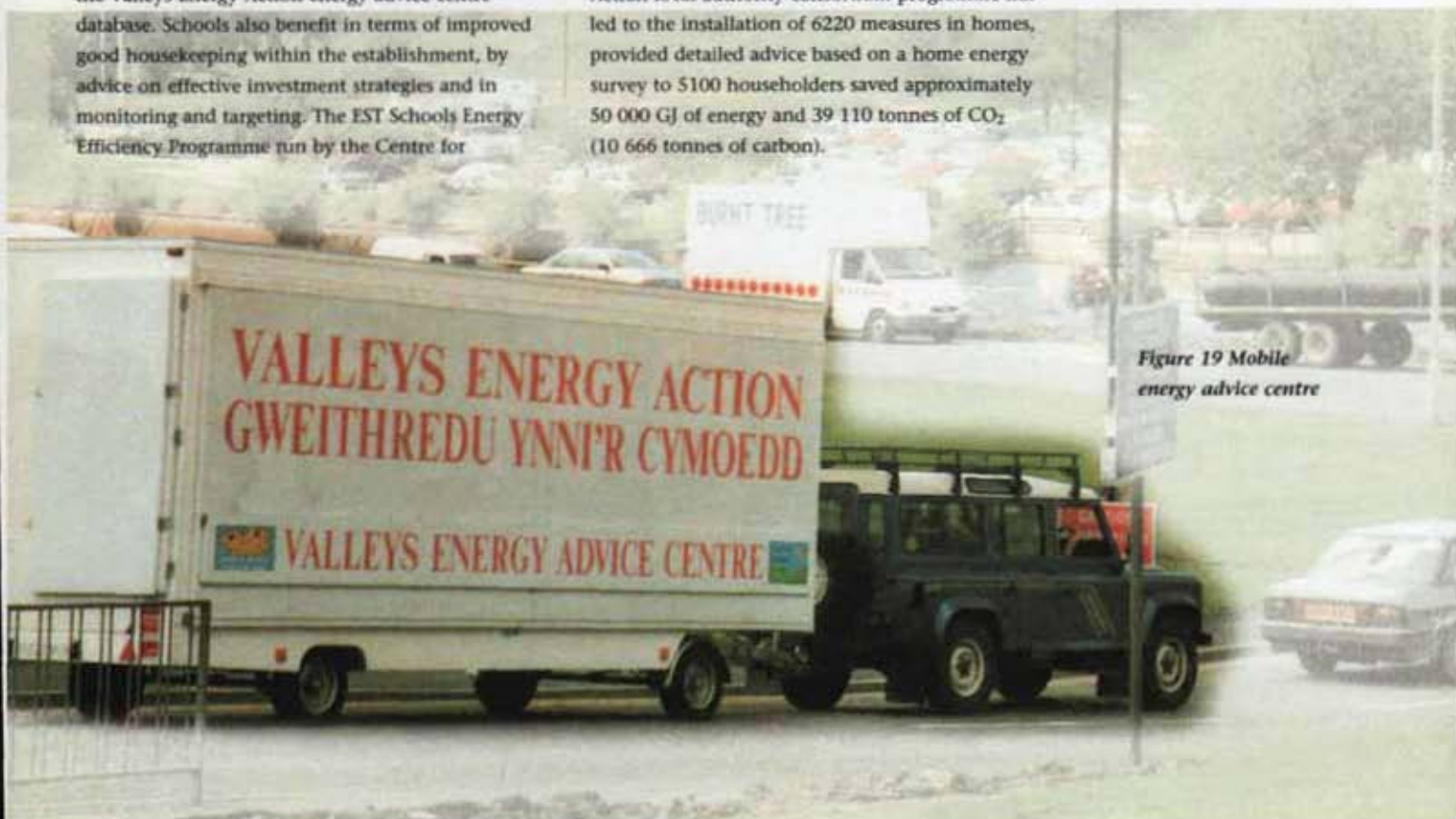
**RESULTS**

In terms of measures installed, the Valley Energy Action local authority consortium programme has led to the installation of 6220 measures in homes, provided detailed advice based on a home energy survey to 5100 householders saved approximately 50 000 GJ of energy and 39 110 tonnes of CO<sub>2</sub> (10 666 tonnes of carbon).

*Figure 18 Energy advice being given at the mobile centre*



*Figure 19 Mobile energy advice centre*





## CASE STUDY 5

## An energy and environmental prediction tool for planning sustainability in cities

The Energy and Environmental Prediction (EEP) model is an environmental auditing and decision-making tool for city planners and others in pursuit of sustainable development. The EEP model uses geographical information system (GIS) techniques and incorporates a number of sub-models to establish current energy use and emissions produced by buildings, transport systems and industry. Initially developed for the City of Cardiff, the EEP model can be used by other cities to predict the effects of future planning decisions, from a whole-city level down to a more local level. It will allow the quantification of factors and indicators that can be used as a measure of sustainability.

The EEP model will:

- quantify energy consumption for different activity sectors and spatial areas
- predict future levels of energy consumption by activity sector and spatial area
- calculate the associated emissions from energy use
- establish a baseline for energy consumption and emissions at 1990 levels
- monitor progress towards agreed targets
- help assess the cost and other implications of alternative energy management options
- assess the likely effect of developments on overall travel patterns and new road systems
- predict the impact of renewable energy strategies

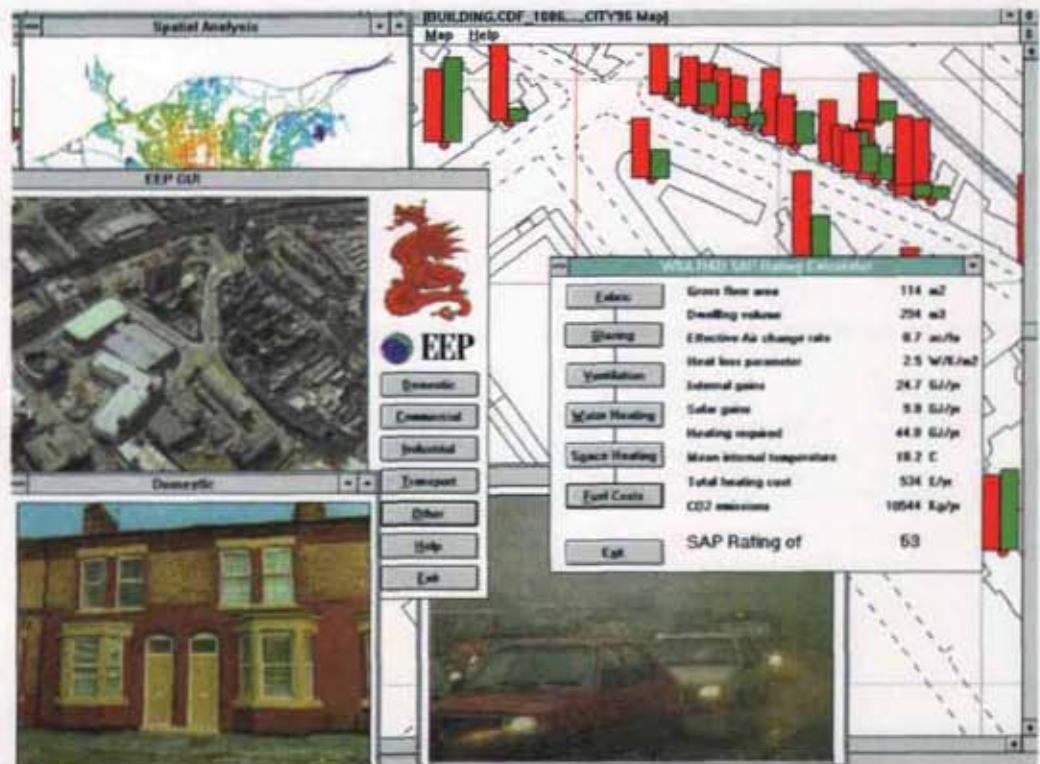


Figure 20 An example of using EEP. The windows illustrate: the domestic building energy model (based on SAP); a portion of the OS map with energy use of individual buildings; and a traffic flow analysis across the city's road system



## CASE STUDY 5

- Identify sites for future development in accord with the aims of sustainable development
- predict the incremental and cumulative impact on energy use and emissions of proposed developments and policies.

The model is accessible on a personal computer (PC) operating under Windows™. The user will access the tool via a primary user interface. This takes the user through a decision-making process, presenting information and options and the opportunity to enter data in a straightforward manner (see figure 20).

The EEP tool was developed at the Welsh School of Architecture with funding from the Engineering and Physical Sciences Research Council (EPSRC), Cardiff City Council, South Glamorgan County Council, Mid-Glamorgan County Council and Newport County Borough Council.

#### BUILDING ENERGY USE - DOMESTIC PROPERTIES

The EEP model will produce estimates for domestic energy use and emissions for properties in the city using a method based on the UK SAP. This method calculates a SAP energy rating, CO<sub>2</sub> emissions, and the cost of energy for individual buildings or for whole areas.

The SAP calculation can be applied to a large sector of the housing to predict the energy savings and CO<sub>2</sub> reductions due to various measures. Figure 21 presents the variations in CO<sub>2</sub> emissions when considering different energy efficiency measures in an average house, based on an analysis of the 2000 houses shown in figure 22. This indicates the possibility of up to 25% energy savings from a package of typical energy-saving measures.

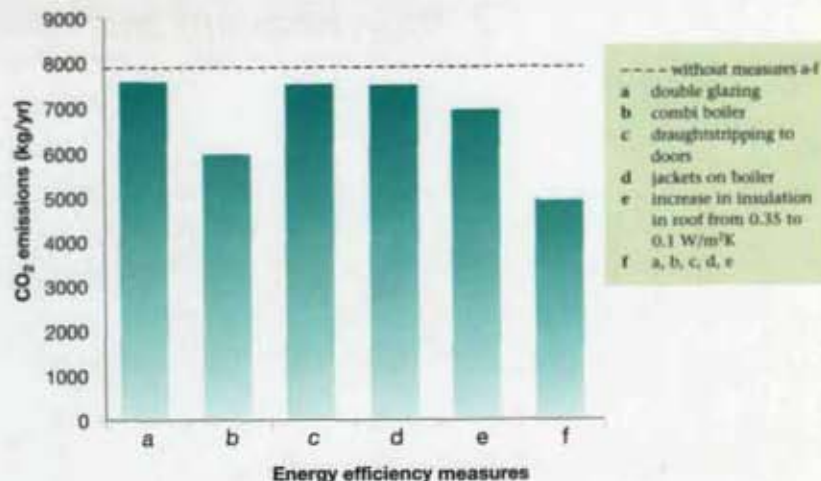


Figure 21 Variations in CO<sub>2</sub> emissions when considering different energy efficiency measures in an average house from a sample of 2000 houses

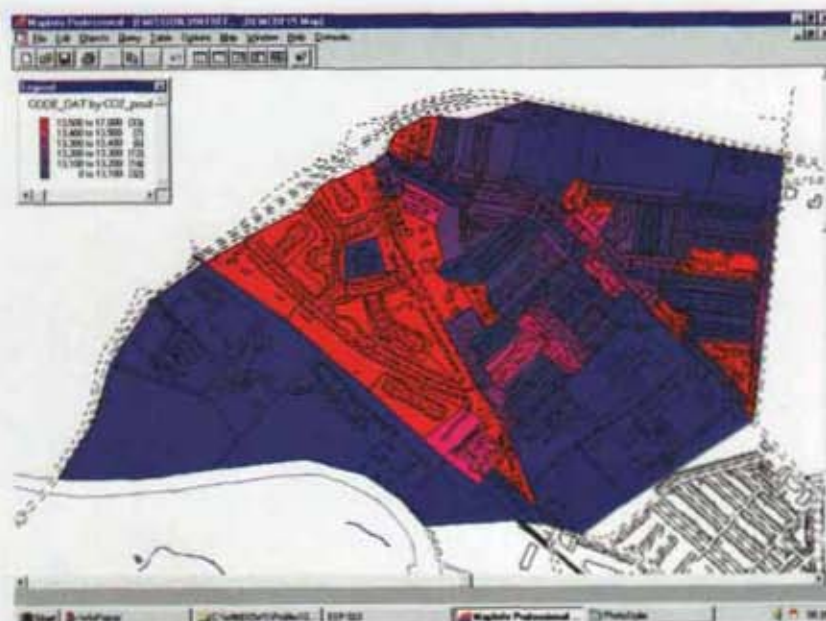


Figure 22 An area of the city indicating the CO<sub>2</sub> emissions from domestic properties based on the SAP rating analysis

## CASE STUDY 6

## Cardiff South Riverside Area Renewal Scheme

The works carried out in the renewal area of 2314 properties started in the summer of 1992. It is intended that approximately 1800 households will be improved over a 10-year period. The scheme is funded by the Welsh Office and Cardiff County Council.

The renewal area consists mainly of solid wall pre-1919 terraced housing. The properties were mostly single-glazed, with rudimentary heating (old central heating system or individual gas or coal room heaters). Where boilers existed, they often had not been serviced for some 15 years.

**ENERGY-EFFICIENT IMPROVEMENTS**

It was decided to adopt a much longer-term approach to payback than that associated with standard renovation. Thus a comprehensive energy efficiency package was offered.

**EXPECTED RESULTS**

Figure 24 presents the energy and CO<sub>2</sub> performance of a typical house in the renewal area, before and after improvements. The Government's SAP was used to provide energy ratings for the dwellings.

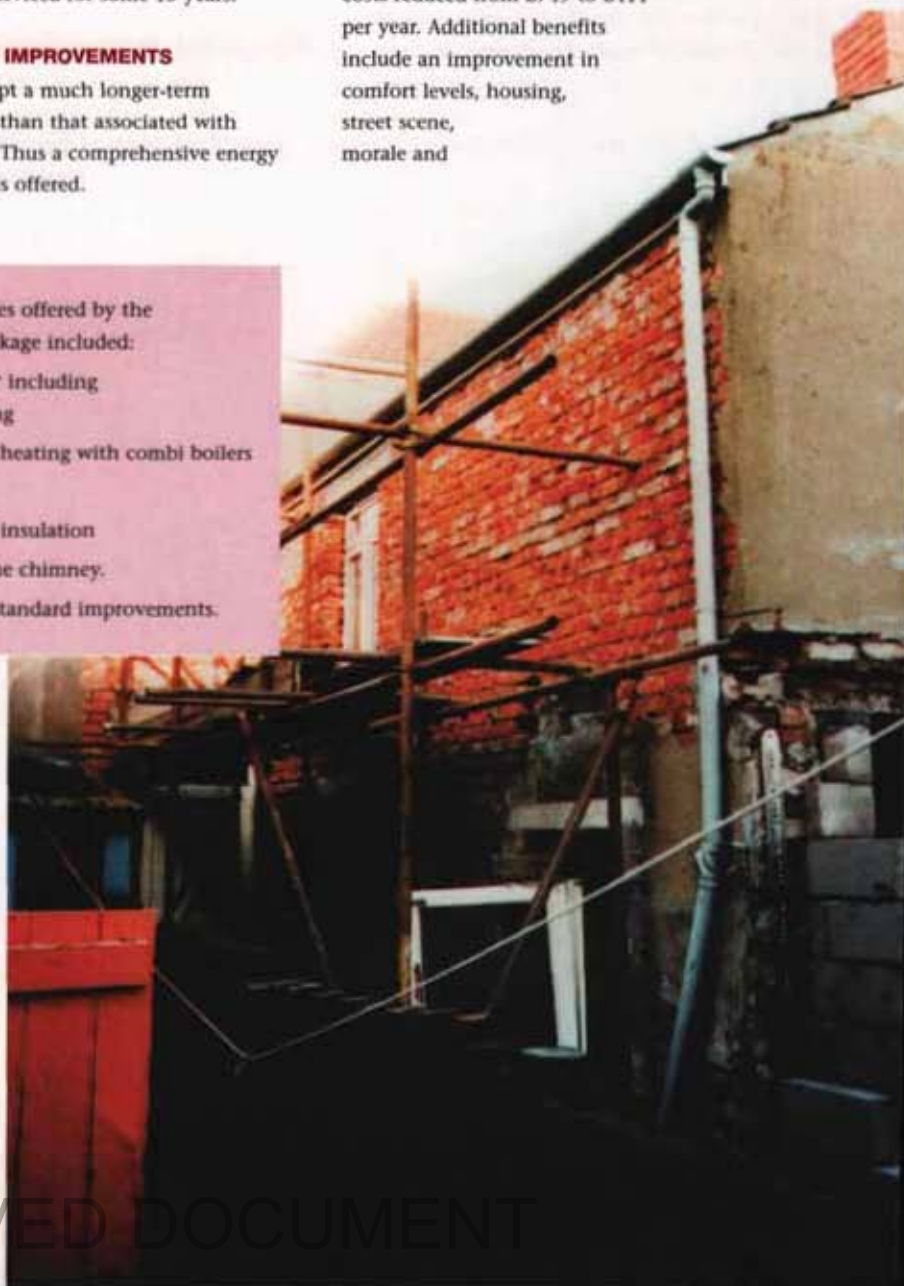
Improvements are expected to reduce CO<sub>2</sub> emissions by over half for each property. It is estimated on average that the SAP rating has increased by almost 30%, from 40 to 69. Furthermore, it is expected that £338 per house will be saved each year, with heating costs reduced from £749 to £411 per year. Additional benefits include an improvement in comfort levels, housing, street scene, morale and

The energy measures offered by the comprehensive package included:

- double glazing\* including draughtstripping
- full gas central heating with combi boilers
- loft insulation
- dry-lining wall insulation
- reduction to one chimney.

\* Also installed in standard improvements.

*Figure 23  
Typical  
housing during  
refurbishment  
in the South  
Riverside  
renewal area*





## CASE STUDY 6

pride, reduced fly tipping and graffiti and an increase in occupier standards, the local environment and the number of employers/shops.

## RESIDENT SURVEYS

A resident's feedback survey was undertaken in 1995/6 to explore the effects and relative importance of various aspects of the improvements and the standard of the service provided during the renewal process. High levels of satisfaction were found, and it was decided that a further survey would be conducted to determine whether housing improvements bring any health benefits, especially with regard to conditions affecting the elderly such as respiratory diseases, angina and arthritis.

A joint venture has been created with Bro Taf Health Authority, the University of Wales College of Medicine, the School for Environmental Sciences at University of Wales Institute of Cardiff and the CHEST Medicine and Paediatric Departments of two local National Health Service Trusts.

	Heating required (GJ/yr)	Total heating cost (£/yr)	CO <sub>2</sub> emissions (kg/yr)	SAP rating	Carbon emissions (kg/yr)
Pre-renewal	133.6	749	11080	40	3022
Post-renewal	50.7	411	5078	69	1385
Savings	82.9	338	6002	29	1637

*Figure 24 Energy and CO<sub>2</sub> performance (domestic heating and hot water only) of an average house in the renewal area both before and after refurbishment*



*Figure 25 Typical housing after refurbishment in the South Riverside renewal area*

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**Office of Electricity Regulation (OFFER)**

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**Office of Gas Supply (OFGAS)**

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## FURTHER INFORMATION

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### DETR ENERGY EFFICIENCY BEST PRACTICE PROGRAMME DOCUMENTS

The following Best Practice programme publications are available from BRECSU Enquiries Bureau. Contact details are given on the back page.

#### Good Practice Guides

- 82 Energy efficiency in housing – guidance for local authorities
- 155 Energy efficient refurbishment of existing housing – a refurbishment guide for housing associations and landlords

#### General Information Leaflet

- 82 Energy efficiency in housing – guidance for local authorities

#### General Information Reports

- 50 Unlocking the potential – financing energy efficiency in private housing
- 51 Taking stock – private financing of energy efficiency in social housing



**The Department of the Environment, Transport and the Regions' Energy Efficiency Best Practice programme** provides impartial, authoritative information on energy efficiency techniques and technologies in industry and buildings. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. Publications within the Best Practice programme are shown opposite.

**For further information on:**

Buildings-related projects contact:  
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**Energy Consumption Guides:** compare energy use in specific processes, operations, plant and building types.

**Good Practice:** promotes proven energy efficient techniques through Guides and Case Studies.

**New Practice:** monitors first commercial applications of new energy efficiency measures.

**Future Practice:** reports on joint R&D ventures into new energy efficiency measures.

**General Information:** describes concepts and approaches yet to be fully established as good practice.

**Fuel Efficiency Booklets:** give detailed information on specific technologies and techniques.

**Introduction to Energy Efficiency:** helps new energy managers understand the use and costs of heating, lighting etc.

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